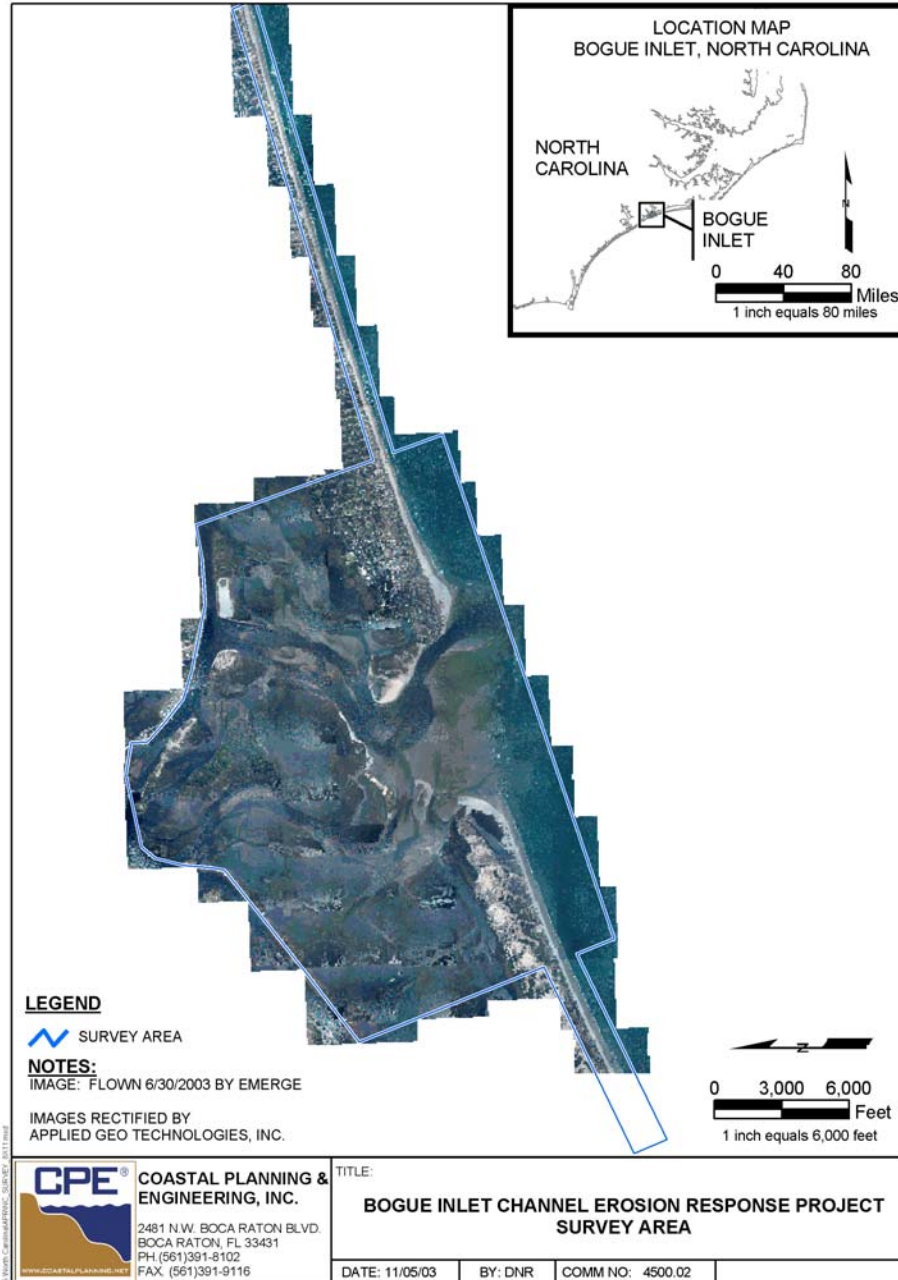


Bogue Inlet Channel Erosion Response Project Draft Environmental Impact Statement



Bogue Inlet Channel Erosion Response Project
Draft Environmental Impact Statement

Legal town and county boundary limits found within the project area are described below.

- Bogue Banks is the southern Outer Banks Island bordered by the Atlantic Ocean to the south and by Bogue Sound to the north. The town of Emerald Isle is located on the western end of Bogue Banks in Carteret County, North Carolina. The "boundaries of the Town of Emerald Isle Begin at a concrete marker at the high water mark of the Atlantic Ocean, this being the southwest corner of Wica Chemical Company property, located South 71 degrees 35 minutes West 7255.0 feet from the church spire at Salter Path Village, and run with the Wica Chemical Company West property line North 03 degrees 35 minutes West 452.80 feet to a concrete monument marked 'A.H. (Alice Hoffman) Lane'; then continuing same course 203.7 feet to a concrete monument at the high water mark of Bogue Sound (Wica Chemical Company northwest corner); continuing North 03 degrees 35 minutes West 1,350 feet to a point in Bogue Sound; then in a westerly direction parallel to and 1,320 feet from the water line of Bogue Sound to a point in Bogue Sound formed by the intersection of this call and a line perpendicular thereto passing through the westernmost projection of Bogue Banks at the mean high water mark; then southerly along the line as extended to a point where said line meets the high water line of the Atlantic Ocean; then due South 2640 feet to a point in the Atlantic Ocean; then in an easterly direction parallel to and 2,640 feet from the high water line of the Atlantic Ocean to a point which is 2,640 feet South 03 degrees 35 minutes East from the concrete monument which is heretofore described as the point of the beginning; thence continuing North 03 degrees 35 minutes West 2640 feet to the point of beginning. All the above courses are based on true meridian". (Municode, 2003)
- Carteret County is located in the southern end of Outer Banks, North Carolina. Carteret County is comprised of approximately 524 square miles (135,715 hectares) of land.
- Onslow County is located in southeastern region of North Carolina approximately 120 miles east of Raleigh, and 50 miles north of Wilmington, NC. The county covers a total of 1.95 square meters 756 square miles (195,803 hectares). Onslow County is south of Pender County, west of Duplin County, north of Jones, and east of the Atlantic Ocean. (Onslow County, 2003)

Bogue Inlet Channel Erosion Response Project Draft Environmental Impact Statement

- Bear Island is an undeveloped barrier island extending 3.5 miles from the west side of the Bogue Inlet complex to the east side of Bear Inlet complex. Bear Island is the largest section of Hammocks Beach State Park, containing approximately 892 acres. Seven hundred acres of Bear Island is a Registered Natural Heritage Area under the Natural Heritage Program.

4.1 GENERAL ENVIRONMENTAL SETTING

Bogue Inlet is located between two barrier islands, Bogue Banks to the east and Bear Island to the west. Bogue Inlet channel is unstable, similar to other natural channel systems, and has been migrating to the east and to the west between Bear Island and Bogue Banks (west end of Emerald Isle). The migratory nature of the inlet contributes to the formation of several shoals and bars in the inlet, as a result of the erosional effects occurring in other areas of the inlet.

There are many permanent and temporary (or ephemeral) islands surrounding the inlet with salt marsh systems developing as a result of the tidal influence and aggradation of organic deposits. Dudley Island to the north of the inlet is a privately owned island comprised mainly of salt marsh habitat. This island is located on the outer bend of the main ebb channel and is experiencing erosion on the southeast side and accretion on the southwest side. Island No. 2 has accreted above the mean high tide level (elevation +2.4 NGVD) with minimal relief located on the west side of the inlet complex. This island appeared to stabilize, since emerging in 1996. However, aerial footage obtained since that time (1998 to present) has shown Island No. 2 to be steadily migrating to the west of the inlet complex. Island No. 1, also an ephemeral island that emerged in 1996, is located on the eastern margin of the ebb tide delta. This island has historically been intertidal; however, the island has recently developed to be exposed during high tide events.

4.1.1 Beach Environments

Oceanfront shoreline beaches can be found along approximately 25 miles of Bogue Banks and approximately 3.5 miles of Bear Island. Dudley Island has a narrow beach system along the south side of the island and north of the inlet complex. These beach systems can be divided into three main ecosystems: foredune, dry beach, and wet beach. Sand dunes and vegetation that comprise the foredune system are extremely important for the North Carolina coastline since they provide protection from storm surge. The foredune system, typically the southern most ridge, is characteristic of an erosional scarp on the beach side. The eroded material contributes to the dry beach located between the toe of dune or scarp and mean high water

Bogue Inlet Channel Erosion Response Project Draft Environmental Impact Statement

(MHW) line. The wet beach is located between mean low water and mean high and is strongly influenced by tidal wave action.

4.1.2 Bear Island

Bear Island is located west of Bogue Inlet and north of Onslow Bay. Bear Island is a barrier island approximately 3.5 miles (5.63 kilometers) long and 1,968.5 feet (600 meters) wide. The undeveloped barrier island is located west of the mid-inlet shoal and is comprised of dune grass habitats, maritime wet grasslands, maritime shrublands, and maritime evergreen forest communities.

Bear Island is part of the Hammocks Beach State Park system that also includes 35 acres on the mainland in the city of Swansboro, and 210 acres on Huggins Island. The State Park is bordered by the Atlantic to the South, salt marshes, estuarine areas, and Intracoastal Waterway to the North, as well as the Western Channel and Bogue Inlet to the east. Bear Island has limited accessibility, with access only available through public ferry service, marine taxi, private boat, canoe, or kayak. Approximately 35,000 visitors per year attend the park at Bear Island utilizing the provided ferries (Sam Bland and Sue Regier, pers. comm.).

Refer to Appendix D – Habitat Maps for a graphical presentation of habitats identified from the June 2003 aerial and field verified in July to September 2003.

4.1.3 Inlet Complex

Bogue Inlet is located in the southwestern boundary of Bogue Banks, approximately 35 miles west-southwest of Cape Lookout in the northeastern portion of Onslow Bay (Figure 1). The inlet is one of the larger inlets in southeastern North Carolina and separates Bogue Banks in Carteret County and Bear Island (Hammocks Beach State Park) in Onslow County. Bogue Inlet drains an expansive marsh filled sound where two large, relatively deep tidal creeks connect the inlet to the Atlantic Intracoastal Waterway and the White Oak River Basin, which includes Bogue Sound. The inlet complex has been a relatively stable feature whose throat section remained in approximately the same location for the past 75 years (Cleary, 1996). The ultimate origin of the inlet is related to the ancestral channel of the White Oak River, which controlled the location of the inlet as sea level rose during the past four thousand years. The inlet is currently controlled by ancestral drainage patterns.

Bogue Inlet has been classified as a wave-influenced transitional inlet with an exceptionally wide throat (~8,500 feet), a relatively narrow ebb channel (~700 feet), and a large mid inlet shoal that occupies most of the western

Bogue Inlet Channel Erosion Response Project Draft Environmental Impact Statement

portion of the floodway (Cleary and Marden, 1999 CSE, 2001). The ebb channel is unstable and has a history of migration related to spit growth on opposing shoulders. Breaching of the inlet shoals has also led to rapid repositioning of the ebb channel during several time periods since the late 19th century. The most dramatic realignment event occurred in the mid 1950s when the ebb channel was repositioned ~3,000 feet east of its 1938 position. The elevated water level associated with Hurricane Hazel (1954) was the likely trigger mechanism that led to the shoal-breaching event. The rapid realignment of the ebb channel promoted large-scale changes on the Bear Island shoulder as extensive portions of the offshore shoals migrated and welded onto the adjacent shoreline (Cleary and Marden, 1999; C S & E, 2001). The direction and rate of channel migration has varied considerably since 1938. During the past three decades, the channel has steadily migrated in an easterly direction at an average rate of ~75 feet/year.

4.2 GEOLOGY AND GEOMORPHOLOGY OF STUDY AREA

Most shoreline features in North Carolina, are controlled by the pre-Holocene stratigraphic framework of the shore face and most of these beaches are perched on top of pre-existing Pleistocene, Tertiary, and Cretaceous consolidated sediments (Riggs, 1996). North of Cape Lookout the geological framework consists of a Quaternary sequence that fills a regional depositional basin called the Albemarle Embayment. The coastal zone south of Cape Lookout is dominated by Tertiary and Cretaceous units that outcrops across the coastal plain and continental shelf, with very thin Quaternary units only locally preserved.

Superimposed upon this regional stratigraphy is an ancient drainage system resulting in a series of fluvial valleys filled with younger coastal sediments separated by large interfluvial areas of older stratigraphic units. This results in a coastal system in which the shore face is either nonheadland or headland dominated (Riggs, 1996).

Tertiary and Quaternary marine sediments in the North Carolina Coastal Plain are distributed on two crustal blocks, the Onslow block in the southern section, and the Albermarle block to the north section (Harris, 1996). The study area is situated on top of the Onslow block.

Regional geology and stratigraphy of this area was described by Mixon and Pilkey (1976). The Waccamaw / James City formations were used for description of early Pleistocene sediments of similar lithology that occur on the southern and northern parts of the Onslow block. Late Pleistocene units in this area are poorly described and are assigned to numerous lithostratigraphic names (Harris, 1996). Several Pleistocene to early

Bogue Inlet Channel Erosion Response Project Draft Environmental Impact Statement

Holocene scarps and terraces are recognized on the Onslow block between Cape Fear and Cape Lookout such as the Bogue-Suffolk scarp that delimits the modern mainland coast of the Onslow block.

A series of barrier islands spits and cusped forelands form the 115 mile stretch of open coast of Onslow Bay. This mesotidal shoreline is composed of thirteen morphologically diverse barriers that were grouped into distinct classes by Riggs et al. (1996). The main morphological / stratigraphic division occurs between Browns Island and Onslow Beach, where a submarine headland composed of tertiary limestone and sandstone forms a preeminent protuberance along the coast (Cleary, 1996).

Onslow Beach is perched on top of the submarine headland and separates the wide, high beach ridge and modified ridge barriers to the northeast, including the Bogue Banks, from the transgressive barriers with low narrow profiles to the southwest. Overwashes and historic inlet breaches are more common southwest of Onslow Beach on the transgressive barrier systems. Regressive barriers, such as the Bogue Banks situated at the northeastern section of Onslow Bay, are composed of forested beach ridges and contain 15 to 25 times more sand per unit length of coast than do the transgressive, perched barriers at the southwestern section.

4.2.1 Sand Source Location

Alternatives for responding to the inlet shoreline erosion include the possible relocation of the main ebb channel through Bogue Inlet (ocean bar channel) to a more central location between Bogue Banks and Bear Island. Material removed to reposition the channel could be used to close the existing channel located immediately adjacent to the west end of Emerald Isle or be used as a source of beach nourishment material to complete Phase 3 of the Emerald Isle beach nourishment project that covers 20,000 feet of beach beginning at a point 1.5 miles east of Bogue Inlet.

4.2.2 Sand Quality

In July 2002, Coastal Planning & Engineering, Inc. (CPE) collected 27 jet probes and 5 vibracores in Bogue Inlet. Most of the jet probes and vibracores were located within a corridor through which a centrally located channel would pass. The locations of the CPE jet probes and vibracores are shown on Figure 4.1 in Appendix B – Engineering Report.

Jet probes consist of jetting a 20-foot long PVC pipe into the seafloor using a water pump. A CPE geologist/diver observes the depth of the probe and the associated material characteristics as the probe penetrates into the sediment. A small deposit mound is formed around the jet probe site as jetted water carries sediment to the surface. Sand samples are then

Bogue Inlet Channel Erosion Response Project
Draft Environmental Impact Statement

collected by the geologist/diver from these mound deposits. Three samples are obtained 1) a seafloor surface sample, 2) a sample from the jet probe mound that penetrates the seafloor to 20 feet or when the probe hits refusal and 3) a sample collected from a second jet probe mound that penetrates the seafloor at half the depth of the first probe. One sediment sample was analyzed by a standard sieve analysis and the remaining two samples were visually analyzed.

The average mean grain size for all of the jet probe samples subjected to a sieve analysis was 0.27 mm. The silt content of the jet probe samples analyzed by standard sieves was generally below 2 percent; however, since most of the fine grained material is washed out of the sediment during the jet probe process, the silt content indicated by the jet probe samples may not necessarily be indicative of the in situ silt content.

The five vibracores were obtained in July 2002. Each core was measured and labeled onboard the vessel. At the end of each day, the cores were transported to shore where they were cut lengthwise, visually inspected, and sealed in plastic. One-half of each core was shipped to the University of North Carolina at Wilmington for archiving while the other half was transported to the CPE lab in Boca Raton, Florida for detailed analysis. The layering of the sediment was recorded and samples obtained for grain size analysis from each distinct sediment type in the core. The grain size data for all of the samples obtained from the five vibracores is presented in Table 2.